

is not just a GUI front-end, but an integrated environment that can perform sophisticated computational tasks, e.g. importing industry standard file formats and employing parameter sweep functions, which are both lacking in SE, and require minimal interaction by the user. These functions are created using a mixture of Visual Basic and the SE script language. These form the foundation for a high-performance front-end that substantially simplifies use without sacrificing the proven capabilities of SE. The real power of SE-FIT lies in its automated pre-processing, pre-defined geometries, convergence computation operation, computational diagnostic tools, and crash-handling capabilities to sustain extensive computations.

SE-FIT performance is enabled by its so-called file-layer mechanism. During the early stages of SE-FIT development,

it became necessary to modify the original SE code to enable capabilities required for an enhanced and synchronized communication. To this end, a file-layer was created that serves as a command buffer to ensure a continuous and sequential execution of commands sent from the front-end to SE. It also establishes a proper means for handling crashes. The file layer logs input commands and SE output; it also supports user interruption requests, back and forward operation (i.e. 'undo' and 'redo'), and others. It especially enables the batch mode computation of a series of equilibrium surfaces and the searching of critical parameter values in studying the stability of capillary surfaces. In this way, the modified SE significantly extends the capabilities of the original SE.

There is a growing need for SE in subjects such as flows related to micrograv-

ity tankage, inkjet printing, nanotechnologies, transport in porous media, capillary self-assembly and self-alignment, microscale wicking structures, foams, and more. It is hoped that SE-FIT will prove to be an essential tool for myriad capillary design and analysis applications as well as a tool for both education and inquiry.

*This work was done by Yongkang Chen, Mark Weislogel, Ben Schaeffer, Ben Semerjian, and Lihong Yang of the Portland State University Office of Research and Sponsored Projects; and Gregory Zimmerli of Glenn Research Center. Further information is contained in a TSP (see page 1).*

*Inquiries concerning rights for the commercial use of this invention should be addressed to NASA Glenn Research Center, Innovative Partnerships Office, Attn: Steven Fedor, Mail Stop 4-8, 21000 Brookpark Road, Cleveland, Ohio 44135. Refer to LEW-18824-1.*

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## Scalable Integrated Multi-Mission Support System Simulator Release 3.0

*Goddard Space Flight Center, Greenbelt, Maryland*

The Scalable Integrated Multi-mission Support System (SIMSS) is a tool that performs a variety of test activities related to spacecraft simulations and ground segment checks.

The GSC Mission Services Evolution Center (GMSEC) has been advancing new technologies using its architecture to aid missions in the development of control centers, and to enable the interoperability of mission operations center (MOC) components. These new technologies are intended to provide missions with low-cost solutions in implementing their ground systems. SIMSS Version 2.0 was developed to run within the GMSEC architecture as a plug-in component. To accomplish this, SIMSS

is integrated with GMSEC application programming interface (API) 3.0 libraries, which allows SIMSS to successfully operate in the GMSEC environment and communicate with other components using GMSEC messages that are transmitted over the GMSEC messaging middleware interface bus.

This innovation (SIMSS Release 3.0) provides a Generic Simulator module, which supports the use of an XTCE-based project database (PDB) from which telemetry data is generated, and then is published onto the GMSEC message bus.

SIMSS is a distributed, component-based, plug-and-play client-server system useful for performing real-time monitor-

ing and communications testing. SIMSS runs on one or more workstations and is designed to be user-configurable or to use predefined configurations for routine operations. SIMSS consists of more than 100 modules that can be configured to create, receive, process, and/or transmit data. The SIMSS/GMSEC innovation is intended to provide missions with a low-cost solution for implementing their ground systems, as well as significantly reducing a mission's integration time and risk.

*This work was done by John Kim, Sarma Velamuri, and Taylor Casey of Goddard Space Flight Center; and Travis Bemann of Honeywell. For further information, contact the Goddard Innovative Partnerships Office at (301) 286-5810. GSC-16041-1*

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## Mars Express Forward Link Capabilities for the Mars Relay Operations Service (MaROS)

*NASA's Jet Propulsion Laboratory, Pasadena, California*

This software provides a new capability for landed Mars assets to perform forward link relay through the Mars Express (MEX) European Union orbital spacecraft. It solves the problem of stan-

dardizing the relay interface between lander missions and MEX.

The Mars Operations Relay Service (MaROS) is intended as a central point for relay planning and post-pass analysis

for all Mars landed and orbital assets. Through the first two phases of implementation, MaROS supports relay coordination through the Odyssey orbiter and the Mars Reconnaissance Orbiter (MRO).